

Proposed Statement of Work

"PV Manufacturing R&D—Large-Scale Module And Component Yield, Durability, And Reliability"

Title

(Indicate either Category A: PV Manufacturing R&D—PV System and Component Technology, or Category B: PV Manufacturing R&D—PV Module Manufacturing Technology)

Date

1. **Background:** This section should contain information needed to place the responder's program in the proper context with respect to the Background Section of the Work Statement.
2. **Objective:** This section should contain a quantitative description of the major objectives of the proposed multi-year research effort.
3. **Scope of Work:** This section should contain the technical description of the work to be performed. These should be broken down by one year Tasks, with concise descriptions of the work to be done within each Task. Task efforts extending over more than one year must be divided into a separate task for each subcontract year. Because of annual funding constraints, tasks need to be given for each subcontract year of a proposed program. This section should also identify in which Task and in which year of the proposed effort each of the problems identified will be addressed. All responders should give special attention in preparing their Scope of Work to assure that proposed tasks do not represent a duplication of work currently being funded by NREL or other government sources. Tasks identified as duplications of work currently being funded by NREL or other government sources will not be considered when the responder's proposal is being reviewed. Furthermore, any such identified duplication of effort will not be included in a subcontract with a winning offer.

YEAR I

During Year I, the following tasks will be performed:

3.1 Task 1 Title

Abbreviated task description.

3.2 Task 2 Title

Abbreviated task description.

Continue to list tasks as necessary.

YEAR II

During Year II, the following tasks will be performed:

3.3 Task 3 Title

Abbreviated task description.

3.4 Task 4 Title

Abbreviated task description.

Continue to list tasks as necessary.

YEAR III

During Year III, the following tasks will be performed:

3.5 Task 5 Title

Abbreviated task description.

3.6 Task 6 Title

Abbreviated task description.

Continue to list tasks as necessary.

4. **Program Plan:** This section should contain the responder's proposed Program Plan, which divides the entire two-to three-year program into work packages of finite segments. It should include the period of performance, proposed duration of projects in months by 12-month phase, and by Task, including time required for preparation and submission of required reports.

YEAR I

The following tasks and deliverables will be performed and completed during Year I according to the following schedule:

Months	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Task 1	<input type="checkbox"/>	<input type="checkbox"/>		
Task 2	<input type="checkbox"/>	<input type="checkbox"/>		
Task 3	<input type="checkbox"/>	<input type="checkbox"/>		
Etc.	<input type="checkbox"/>	<input type="checkbox"/>		
Monthly Reports		— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th		
Annual Report	— Draft 15th	...	— Final 30th

YEAR II

The following tasks and deliverables will be performed and completed during Year II according to the following schedule:

Months	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Task 4	<input type="checkbox"/>	<input type="checkbox"/>		
Task 5	<input type="checkbox"/>	<input type="checkbox"/>		
Task 6	<input type="checkbox"/>	<input type="checkbox"/>		
Etc.	<input type="checkbox"/>	<input type="checkbox"/>		
Monthly Reports	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th		
Annual Report	...	...	...	...	...	...	...	...	...	...	...	— Draft 15th	...	— Final 30th

YEAR III

The following tasks and deliverables will be performed and completed during Year III according to the following schedule (the last Monthly is replaced by the Final):

Months	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Task 7	<input type="checkbox"/>	<input type="checkbox"/>		
Task 8	<input type="checkbox"/>	<input type="checkbox"/>		
Task 9	<input type="checkbox"/>	<input type="checkbox"/>		
Etc.	<input type="checkbox"/>	<input type="checkbox"/>		
Monthly Reports	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	— 15th	...		
Annual Report	...	...	...	...	...	...	...	...	...	...	...	...	— Draft 15th	— Final 30th

5. **Milestones and Deliverables:** This section should contain a set of measurable and definable milestones and deliverables associated with each Task defined in the Scope of Work. This description should be in the form of a table and/or a Milestone and Deliverables chart.

YEAR I

Proposed Milestones/Deliverables

m-1.1.1 Description of first milestone or deliverable.

Due Date

Task #
(Task #)

m-1.1.2	Description of second milestone or deliverable.	(Task #)
m-1.1.3	Continue to list as necessary...	(Task #)
m-1.1.4		(Task #)

YEAR II

<u>Proposed Milestones/Deliverables</u>	<u>Due Date</u>	<u>Task #</u>
m-2.1.1	Description of first milestone or deliverable.	(Task #)
m-2.1.2	Description of second milestone or deliverable.	(Task #)
m-2.1.3	Continue to list as necessary...	(Task #)
m-2.1.4		(Task #)

YEAR III

<u>Proposed Milestones/Deliverables</u>	<u>Due Date</u>	<u>Task #</u>
m-3.1.1	Description of first milestone or deliverable.	(Task #)
m-3.1.2	Description of second milestone or deliverable.	(Task #)
m-3.1.3	Continue to list as necessary...	(Task #)
m-3.1.4		(Task #)

6. REPORTING AND PRESENTATION/TRAVEL REQUIREMENTS

In addition to the milestones/deliverables above, monthly reports will be submitted, in addition to a Final Report.

If a responder receives an award, deliverables as well as annual and final reports as described in Section 8 below, would be sent to the NREL Technical Monitor, (TM) both hard and electronic copies, with a hard copy of the report sent to the NREL Subcontract Administrator:

Attendance at NREL Subcontractor Annual Review Meetings to be held in the United States at a place and time specified by NREL would be required if an award is received. Any other travel should be detailed here.

7. PRESENTATIONS AND PUBLICATIONS

The subcontractor is expected to attend one program review meeting per year to be held at a place and time specified by the NREL TM and shall present a paper with a complete discussion of work performed under the subcontract. One reproducible master copy of the paper shall be submitted to the NREL TM, and one copy of the paper shall be submitted to the NREL Subcontract Administrator. For estimating purposes, plan one meeting per year at NREL for a duration of two (2) days. In addition, each subcontractor should plan to attend and present at the periodic IEEE PV Specialists conferences, NCPV review meetings, and an additional PV-related conference that occurs during the subcontract period.

Presentations at scientific meetings and publications of research results in scientific journals are encouraged by the PV Manufacturing R&D Project, but must be approved in advance by the NREL Subcontract Administrator. Any costs to NREL that are to be incurred as a result of such presentations/publications must be included in the negotiated cost of the subcontract. Before a representative of the subcontractor submits or presents a publication, the subcontractor shall submit two (2) copies of any publication/presentation (e.g., abstract, reprint of manuscript, etc.) concerning the research effort under this subcontract to the NREL Technical Monitor and one (1) copy to each Technical Advisor. The subcontractor is responsible for obtaining NREL's technical approval. If the subcontractor

is other than a small business concern, educational institution, or non-profit organization who qualifies under P.L. 98-620, the subcontractor must also obtain DOE patent clearance in accordance with Clause 1— Patent Rights (Long Form), prior to any publication or presentation concerning this subcontract effort. The subcontractor should allow at least sixty (60) days to obtain the appropriate technical and patent clearances for the publication or presentation.

Successful responders should also be prepared to respond to requests for written information in summary form as required by the NREL Technical Monitor to meet obligations to DOE. Such requests include, but are not limited to Program Summaries (annually, 1-2 pages) and Summary Annual Reports (2-3 pages). These reports are in addition to the report requirements outlined in Paragraphs 8 and 9 below.

8. PERFORMANCE EVALUATION

The subcontractor's performance will be monitored and evaluated by means of:

- A) Monthly Technical Status Reports consisting of a report of program status relative to milestone and program schedules (6-10 pages);
- B) Annual Technical Progress Reports covering all work done under the subcontract;
- C) A Final Technical Report covering all work done under the subcontract;
- D) At least one review per year by the PV Manufacturing R&D Project TM for this subcontract, and more typically two. These reviews shall entail oral presentations and demonstrations by the subcontractor and may include visits to the subcontractors' work site at the discretion of the PV Manufacturing R&D Project TM.. These meetings will be critical program evaluation points. The progress of the subcontractor will be assessed at this time by reviewing past accomplishments and future program plans. Subcontractor progress will also be monitored by telephone conversations.

9. STANDARD REPORTING REQUIREMENTS

The subcontractor shall be required to prepare and submit the following reports indicated below. If the period of performance for this subcontract begins during the first through the fifteenth of a month, then that month is considered the first full month of the subcontract for reporting purposes. If the period of performance for this subcontract begins during the sixteenth through the end of the month, then the first full month of the subcontract for reporting purposes is the following month. For example, if the period of performance start date is January 10, then January is the first full month for reporting purposes; whereas, if the period of performance start date is January 20, then February is the first full month for reporting purposes.

A. MONTHLY TECHNICAL STATUS REPORT

A monthly report to communicate to NREL an assessment of subcontract status, to explain variances and problems, to report accomplishment of performance milestones and/or program deliverables, and to discuss any other areas of concern or achievements. This report should be six to ten pages written, noting highlights of the month in the opening, in a letter format with emphasis placed on the status and a description of the progress. One (1) copy of this report to each of the Technical Monitoring Team Members (approximately 3) and the NREL Subcontract Administrator, are due on or before fifteen (15) days after completion of each month.

B. ANNUAL TECHNICAL PROGRESS REPORT

A formal structured technical report, both in draft and final version, shall describe all significant work performed during each phase of the subcontract. One (1) copy of this report to each of the NREL Technical Monitoring Team Members (approximately 3) and the NREL Subcontract Administrator, are due at NREL on or before thirty (30) days before the completion date for each year's effort under this subcontract. Subcontractors shall make any corrections or revisions per NREL direction. Subcontractors shall be allowed fifteen (15) days after receipt of NREL's recommendations and/or changes to correct the final version and submit the corrected final version with two reproducible master copies to the NREL TM. An additional copy shall also be distributed to the NREL Subcontract Administrator and those individuals identified in Attachment 2 (a project distribution list to be compiled prior to subcontract execution). If the subcontracted effort in the following year is not authorized and funded by NREL, then this Annual Technical Progress Report shall be renamed the Final Technical Report and the period of performance for that year shall be extended by two and one-half (2-1/2) months.

C. FINAL TECHNICAL REPORT

A formal, structured technical report, both in draft and final version, shall describe all significant work performed during the entire subcontract's period of performance, including pertinent cost information as requested by the NREL TM. One (1) copy of this report to each of the Technical Monitoring Team Members (approximately 3) and the NREL Subcontract Administrator are due at NREL on or before thirty (30) days after the completion of the last phase of the research effort under this subcontract. Subcontractors shall make any corrections or revisions per NREL direction. Subcontractors shall be allowed fifteen (15) days after receipt of NREL's recommendations and/or changes to correct the final version and submit the corrected final version with two reproducible master copies to the NREL TM. An additional copy shall also be distributed to the NREL Subcontract Administrator. A project distribution list to be compiled prior to subcontract execution.

Electronic Reporting Requirements for Subcontract Report Deliverables:

As set forth in Department of Energy Order 241.1A, NREL is required to submit in an electronic format all scientific and technical information, including subcontract report deliverables intended for public distribution, to the DOE Office of Scientific and Technical Information (OSTI). In addition, it is NREL's intention to post subcontract report deliverables containing publicly available information (e.g. non-confidential, non-protected, non-proprietary information) for distribution on the NREL Intranet or the Internet.

The Subcontractor shall provide the final approved version of report deliverables intended for public distribution as specified in the deliverable schedule of this Statement of Work in accordance with the following electronic reporting requirements:

- a. The Subcontractor shall submit all report deliverables intended for public distribution (including status, annual, or final reports) as electronic files, preferably with all graphics and images embedded within the document. The electronic files shall be submitted along with an accompanying hard (printed) copy(ies) of the report. Limited exceptions allowing some graphics and images to be submitted as hard copies only may be granted on a case-by-case basis. The exceptions process for graphics and images is described in Paragraph E below. It shall be made clear in the deliverable transmittal letter that certain graphics and images are supplied in hard copy only.
- b. All final approved version submissions shall be delivered to NREL on PC or MAC-formatted media (3.5 inch disks, Zip and Jaz cartridges, or CD-ROM). Files of 1 Mb or less can be sent via e-mail to the 1) NREL technical monitor, 2) the NREL Subcontract Administrator or Associate (as specified in the Statement of Work).
- c. The preferred format is a single electronic file that includes all of the text, figures, illustrations, and high-resolution digital photographs (or photographs should be scanned and incorporated in the text). Acceptable file formats are:

Microsoft Word (v.6.0 or newer for PC or MAC)
WordPerfect (v.6.1 or newer for PC)
Microsoft PowerPoint
Microsoft Excel

- d. If it is not possible to include all of the graphics and images (figures, illustrations, and photographs) in the same file as the text, NREL will accept the text in one of the above formats and the graphics and images as separate electronic graphic or image files*. The native files for any page layout formats submitted shall be supplied. The following software is supported on both Mac and PC platforms:

QuarkXPress (.qxd)	Pagemaker (.pm)
Photoshop (.psd)	Illustrator (.ai)
Freehand (.fh)	Corel Draw (.cdr)
Framemaker (.fm)	Microsoft Publisher(.pub)

* The acceptable graphic or image file formats are: .eps, .tif, .gif, .jpg, .wpg, .wmf, .pct, .png, .bmp, .psd, .ai, .fh, .cdr. The preferred resolution for graphics or images is 150 to 300 dpi. Include all fonts that were used in creating the file.

- e. In the rare case that the graphics or images cannot be supplied electronically, either incorporated within the text or as a separate electronic file, original hard copies will be accepted. The Subcontractor shall obtain prior approval from the Subcontract Administrator before submitting graphics or images in hard copies. It shall be made clear

in the deliverable transmittal letter that certain graphics and images are supplied in hard copy only.

- f. For all calculations in support of subcontract reports that are conducted in ASPEN+, an electronic copy of INPUT, REPORT and BACKUP (if Model Manager is used) must be submitted with all reports. Additionally, if costing or sizing calculations are conducted in a spreadsheet [no process calculations (heat and material balances) in spreadsheet format are permitted], a copy of the fully documented MS Excel file shall be supplied. Note that vendor quotes and other non-original material can be supplied in hard copy.
- g. A fully executed release shall be supplied to NREL with all photographs, regardless of whether such photographs are delivered to NREL electronically or in hard copy. Such release shall certify that the National Renewable Energy Laboratory and the United States Government is granted a non-exclusive, paid-up, irrevocable, worldwide license to publish such photographs in any medium or reproduce such photographs or allow others to do so for United States Government purposes.
- h. The Subcontractor may contact NREL Publication Services at (303) 275-3644 with questions regarding technical guidance concerning the submission of subcontract report deliverables as electronic files or exceptions to electronic files for graphics and images.